

## Claims

What is claimed is:

1. A method for verifying the correctness of the system behavior of a processor cooperating with software, the method comprising the steps of:

testing the software by using a functional simulator performing in the same way as the hardware of the processor according to the processor's functional specification; and

testing microcode by using a hardware emulator behaving in the same way as the hardware of said processor according to the design of the processor's logic gates.

2. The method of claim 1, whereby the method includes verifying the correctness of the system behavior of a CPU comprising processor hardware and having at least a part of its instructions implemented in microcode.

3. The method of claim 2, whereby said microcode includes millicode procedures and processor code functions, the method further comprising an initial step of testing the millicode procedures and the processor code functions independently.

4. The method of claim 3, whereby testing the millicode procedures includes the step of running the millicode procedures on a functional emulator offering the functional behavior of the processor hardware with which the millicode interacts.

5. The method of claim 3, whereby testing the processor code functions includes the step of running a virtual machine emulating a physical computing environment corresponding to the

processor for which the correctness of system behavior is being verified.

6. The method of claim 5, whereby testing the processor code functions includes the step of providing a simulator interpreting processor code instructions which are not provided by said virtual machine.

7. The method of claim 1, whereby said processor is in communication with a service element code that has to be validated as well, the method further comprising the step of testing the service element code independently.

8. The method of claim 7, whereby testing the service element code includes the steps of disconnecting a service element on which the service element is executed from the processor and providing simulation routines behaving like an attached processor according to its functional specification.

9. The method of claim 5, further comprising the step of testing different kinds of microcode in an environment in which all of the microcodes interact as they would run on the processor.

10. The method of claim 9, whereby the step of testing the different kinds of microcode comprises the step of communicating with a service element code.

11. The method of claim 9, whereby testing the different kinds of microcode comprises the step of providing a TCP/IP connection between the different systems executing the different kinds of microcodes.

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12. The method of claim 9, whereby testing the different kinds of microcode includes the step of specifying particular processor code instructions that are not executed by the virtual machine, but by using the microcode procedures instead.

13. The method of claim 9, further comprising the step of testing said microcode by running it on the processor.

14. The method of claim 7, further comprising the step of testing the service element code by letting it communicate with the processor.

15. The method of claim 1, wherein the step of testing the software includes the step of providing a high-level description of the processor's functional behavior in a hardware description language, such as VHDL.

16. A computer program product stored on a computer usable medium, comprising computer readable program means for causing a computer to perform a method for verifying the correctness of the system behavior of a processor cooperating with software, the method comprising the steps of:

testing the software by using a functional simulator performing in the same way as the hardware of the processor according to the processor's functional specification; and

testing microcode by using a hardware emulator behaving in the same way as the hardware of the processor according to the design of the processor's logic gates.

17. A system for verifying the correctness of the functional behavior of a processor having at least a part of its instruction

set implemented with microcode, wherein the microcode includes millicode procedures and processor code functions, the system comprising:

a simulator performing in the same way as the hardware of the processor according to the processor's functional specification for testing the millicode;

a virtual machine providing a platform for testing the processor code functions; and

a hardware emulator behaving in the same way as the hardware of the processor according to the design of the processor's logic gates for testing the microcode.

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